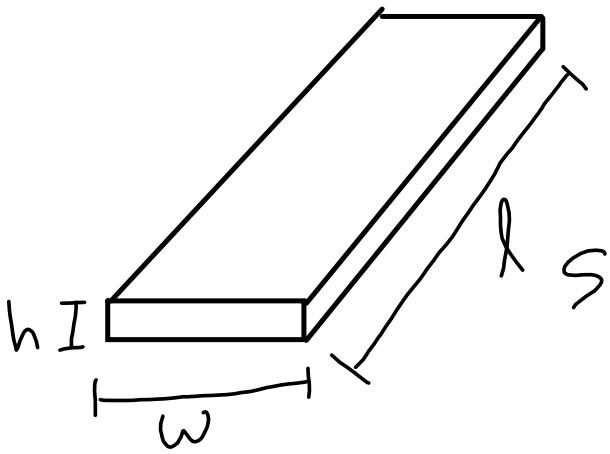
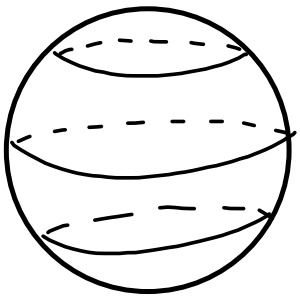


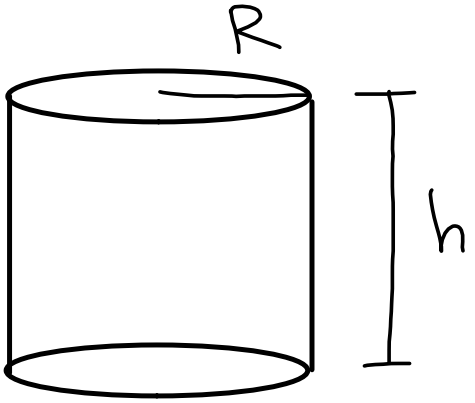
$$V = l \times w \times h$$

$$SA = 2\left(h \times w + h \times l + w \times l\right)$$



$$V = \frac{4}{3}\pi R^3$$

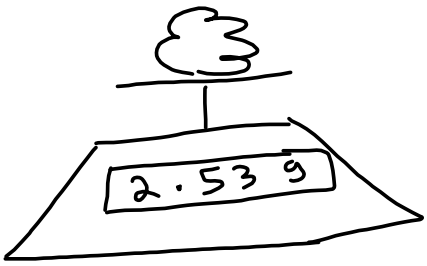
$$SA = 4\pi R^2$$



$$V = \pi R^2 h$$

$$SA = 2(\pi R^2) + 2\pi R h$$

Uncertainty (aka error)



$m = 2.53 \pm 0.005\,g$

half of smallest reading

Error propagation:

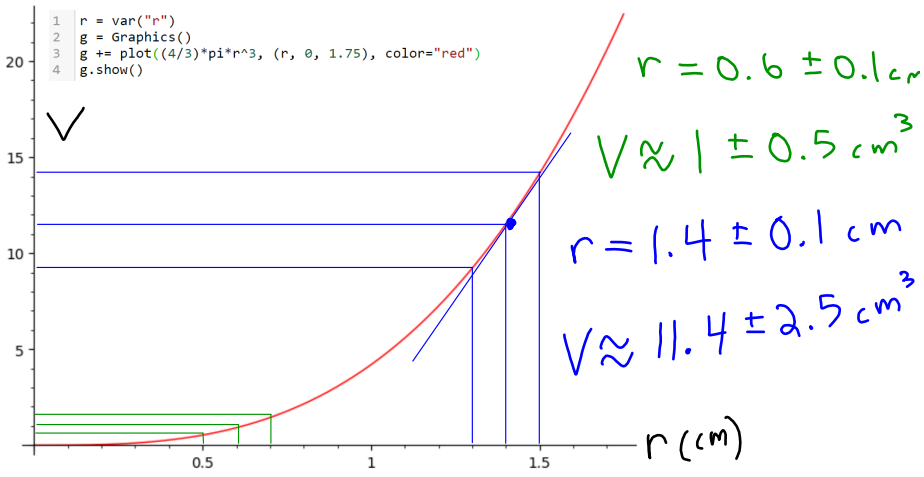
Rec. Prism (e.g.)

$w = 275.2 \pm 0.1$ cm

$h = 2.355 \pm 0.025$ cm

$l = 83.42 \pm 0.05$ cm

What is the uncertainty in volume and surface area?



$r = 0.6 \pm 0.1\ cm$

$V \approx 1 \pm 0.5\ cm^3$

$r = 1.4 \pm 0.1\ cm$

$V \approx 11.4 \pm 2.5\ cm^3$

$f(x,y) \qquad x = x_0 \pm \delta x$

$y = y_0 \pm \delta y$

$f_0 = f(x_0, y_0)$

$\delta f = \sqrt{\delta f_x^2 + \delta f_y^2 \left(+ \delta f_z^2\right.}$

where

$\delta f_x = \left.\frac{df}{dx}\right|_{x_0,y_0} \cdot \delta x$

$\delta f_y = \left.\frac{df}{dy}\right|_{x_0,y_0} \cdot \delta y$

$\left(\delta f_z = \left.\frac{df}{dz}\right|_{x_0,y_0,z_0} \cdot \delta z \right)$